Massachusetts Bay Transportation Authority

Request for Information

RFI Number: 180-21

Specification Development for Reduced Carbon Emissions Vehicles:

Battery Electric Multiple Units

November 26, 2021

Responses Due: December 23, 2021
CommBuys Bid **#:** BD-21-1206-40000-40000-68878

Request for Information

Issue Date:

Department	Procurement & Logistics Department
Address	MBTA, 10 Park Plaza, Room #2810
City, State, Zip Code	Boston, MA 02116
Procurement Contact Person	Michael Pillemer
Telephone Number	781-799-3172
E-Mail Address	mpillemer@mbta.com
RFI Name/Title	Specification Development for Reduced Carbon Emissions Vehicles: Battery Electrical Multiple Units
RFI Number	# 180-21
CommBuys Bid Number	# BD-21-1206-40000-40000-68878

Introduction:

The MBTA is committed to providing safe, reliable, and efficient transportation to the region it serves. The MBTA's commuter rail operation is currently operated with Push-Pull, Diesel electric locomotives servicing two major Hubs: Boston's South Station and North Station. The MBTA's South Side Operation consisting of 9 (nine) commuter rail lines that originate from South Station; and the MBTA's North Side operation with 5 (five) commuter rail lines from North Station. Included in the MBTA's South Side operation is passenger service on the MBTA owned Northeast Corridor between Boston and the R.I. Stateline that is electrified and maintained by Amtrak. Approximately half of the MBTA's current locomotive fleet will reach life expiration by 2030 and in the same period the remaining portion of the fleet will reach mid-life and require refurbishment in the 2027-2032 time frame.

The board of the MBTA in 2020 directed staff to transform and decarbonize the current commuter rail service and move to a service similar to rapid transit providing all day substantially electrified service at intervals on its most dense corridors at 15-20 minute headways (referred to as regional/urban rail). Given the timeframes of rolling stock procurement and the urgency of the combined goals of fleet replacement and rail transformation, the MBTA is seeking a rapid information gathering process to facilitate its decision making, especially in the light of the passing of the 2021 Infrastructure Investment and Jobs Act.

Scope:

The MBTA is looking to replace the existing diesel hauled commuter rail fleet with a combination of:

- Battery Electric Multiple Units (BEMUs), to replace life-expiring locomotives and coaches in the medium term;

- Multi-Mode locomotives (some combination of battery, diesel, OCS powered electric traction with the capability to be modified in the future), to replace life-expiring locomotives and be fully compatible with the existing push/pull equipment.

This RFI will focus on Battery Electric Multiple Units. A separate RFI will be issued for Multi-Mode Locomotives. Both vehicles will be required to operate with existing overhead catenary systems.

MBTA envisions:

<u>BEMU Request For Information:</u>

- Equipment would be utilized initially on the North-East Corridor, Stoughton branch, Rockport/Newburyport Lines, and the Fairmont Line. It is planned for other lines later.

- That this Rolling stock will be in full compliance with the applicable standards and recommended practices of the FRA, AAR, and all applicable Federal and State laws, rules and regulations and all industry recommended practices in effect at the time of the signing of Contract.

- The Rolling Stock should be capable of using overhead catenary power systems installed over most of each route, with battery-only operation over limited sections of track where catenary installation would be difficult or expensive. Battery recharging could be accomplished with high powered charging stations, layover facilities and/or in-motion charging using catenary power or regenerative braking. All battery charging recommendations need to be included with RFI.

- The MBTA would prefer the new equipment be interoperable (run on the same line and at the same time as existing equipment) with the MBTA's existing fleet and operations.

- Alternative compliance may be acceptable when non-US standards can be demonstrated as equivalent or better.

The Authority wishes to ensure that its specification requirements not only meet the Authority's service and maintenance needs, but also allow for a competitive bid process that provides equal opportunity for many bidders. To facilitate that process and maximize potential bidders, the MBTA has developed this RFI which seeks information from interested parties to assist the MBTA in development of specification requirements.

In addition, they must be compatible with the Authority's existing infrastructure, which includes a mixture of high-level and low-level station platforms. As the procurement is expected to be federally funded, all federal requirements will be applicable, including all FRA/ADA requirements and Buy America provisions.

The MBTA requests that prospective respondents provide the MBTA with descriptions of existing equipment designs that might be suitable for the Authority's commuter rail service, as well as any additional variations that would be reasonably feasible to better adapt the designs to the Authority's needs. Key differentiating features should be highlighted to allow the specification to be as inclusive as possible.

Purpose of Request for Information (RFI)

The purpose of this RFI is to assist the MBTA with the development of concept reports and a technical specification to be used in the procurement of BEMU vehicles to integrate with existing push/pull Bi-Level Coaches. In addition, this RFI seeks to determine what information is required by potential third party contractors to complete a bid on such a contract, as well as any other input potential respondents would suggest for the development of the RFP.

The scope of services for the RFP will include design, manufacture, testing, and warranting of the vehicles, in addition to providing operations and maintenance training and manuals, drawings, schematics and other support documentation.

After receiving input from this RFI, the MBTA will schedule interviews (workshops) with the submitters to aid in the development of an RFP which will be used in a formal bid process to identify a qualified car builder to design, manufacture, test and warrant the new equipment.

Basic Requirements:

As presented above, the MBTA is looking for input and recommendations for the development of the subject RFP. Key criteria for the development of the RFP are as follows:

Current MBTA Bi-Level Specifications (for reference)

		Control Trailer Coach	Blind Trailer Coach
Coach Dimensions	Length-Over Coupler Pulling Faces	85.42 Ft	
	Length-Between Truck Centers	62.5 Ft	
	Width-over side sheets (max)	10 Ft	
	Height over top of Rail (max)	15'6.25"	
	Wheel Diameter	36 Inches	
	Maximum Wheel Wear (diameter)	3 Inches	
Side Doorways	Door Openings	4 per coach	
	Clear Door Opening	39"	
Weight	Coach Tare Weight (approx.)	145,855 lbs.	143,048 lbs.
Seating Capacity	Seats	173	179
	Wheelchair	3	2
Performance	Maximum Design Speed	103 MPH	
	Maximum operating speed	90 MPH	
	Minimum radius	250 Ft	
	Maximum superelevation	6 Inches	
	Track Gauge	4 ft. 8 ½ inches	
	Track Class	5	

For complete bi-level arrangement drawing, please see Appendix.

The current bi-level coaches employ corner point, automatic sliding doors with manual traps to access both high and low platforms.

Maximum height over the roof sheets shall be 15'6.25" including camber and the coaches shall be capable in all respects for operation at a minimum safe speed of 120 mph (193 kmph) on level tangent track and on super-elevated curves.

Proven Design Concept & Components

The Authority would like to identify qualified, experienced car builders with the capability to provide reliable, high-quality equipment for use on the MBTA's commuter rail service. The Authority prefers the use of a proven design with proven components that could be readily adapted for use on the Authority's network. Quality, reliability, and durability of the equipment is of paramount importance.

Contractor will be experienced and capable in the design, manufacture, testing and warranting of this equipment, including selection and integration of major railcar components. It is expected that the contractor will possess an in-house team that is supported, as needed, by qualified subcontractors capable of providing and integrating key components.

Delivery Timeline

The MBTA envisions a 42-month from NTP delivery requirement for the pilot vehicles. MBTA is looking for experience from other projects on project delivery timelines.

FORMAT OF RESPONSE TO THIS RFI:

Please include answers to the following questions in your response to this RFI, and format your response in the order of the questions below

A. Introduction/Cover Letter: Please introduce your company and an overview of its experience with the design and manufacture of BEMU and/or Dual Mode Locomotive. Please do not include corporate marketing brochures.

B. Technical Questions & Information Sought: *Please respond to the following questions:*

a. Please provide your experience in designing, manufacturing, and warranting BEMU trainsets for commuter rail service.
    i. Please provide information about prior contracts
    ii. Please provide information about potentially suitable existing car designs.
b. Please present your level of interest in pursuing a contract such as the one described. If there are specific issues that would deter or encourage your firm from pursuing this contract, please describe what they are.

C. Response 1 – BEMU Information Sought:

For your BEMU vehicles, please provide the following information.

a. How long have your trains been in service?
    i. Which Authorities?
    ii. Number of trains of each type of service?
    iii. Maximum service?
b. How many trains in service?
    i. Which Authorities?
    ii. Number of trains of each type in service?
    iii. Maximum service?
c. What is the duration of Prototype and pre-service testing?
d. Do you have a design or prototype in development for a BEMU trainset that is not yet in service? Please describe.
e. Total orders for BEMU trainsets, including current orders?
f. Which Authorities are running your trains?
g. List all Authorities which have maintenance contracts for your trains.
h. If your product uses batteries, please share who your battery supplier is.
i. If your product uses batteries, please share who your charging station supplier is.
j. Do any of your existing products use low-level and high-level entry?
    (See Appendix for reference for current MBTA equipment)
k. Do you have US experience providing trains or vehicles?

D. BEMU Battery System Information Sought:

Provide the following information related to battery systems installed on delivered BEMUs:

Battery System Technology Summary

TYPE	Manufacturer(s)			
	Battery chemistry			
	Manufacturing Location(s)			
SIZE & WEIGHT	Battery Cell [1]	Length, width, height	*inches*	
		Weight	*pounds*	
	Battery Pack [2]	Length, width, height	*inches*	
		Weight	*pounds*	
		Voltage (nominal)	*dc volts*	
		Energy Capacity (nominal)	*kWh*	
ENERGY	Maximum Energy Storage Available on 4-car Train set	Total (nominal)	*kWh*	
		Usable	*kWh*	
PERFORMANCE	Maximum under battery only power	Acceleration rate	*MPH/S²*	
		Top speed	*MPH*	
CHARGING	Maximum battery charging rate	Stationary	*kW*	
		In-motion, from catenary [3]	*kW*	
		In-motion, accept braking energy [3]	*kW*	
OPERATING ENVIRONMENT	Ambient Temperature	Minimum	*° F*	
		Maximum	*° F*	

[1] Smallest line replaceable unit *[2] Largest individual unit on BEMU*

[3] If not supported, enter "not applicable"

E. Trainset Operational Characteristics

a. Provide drawings showing battery pack location(s) on each BEMU and/or on variable multi-car train sets if available (i.e., combination of single and bi-level cars). Drawings should show routing of all high voltage cables.
b. Describe the battery thermal management system used, including power draw (kW) and external power requirements (if applicable) for overnight storage during winter operations (ambient temperature 40° F to -20° F). Weekend storage times may exceed 48 hours.
c. Provide all Standards used in the development of your battery system.
d. Describe available battery charging scenarios, including limitations, if any. At a minimum describe:
    i. Stationary charging (at terminal)
    ii. In-motion charging from overhead catenary, and
    iii. In-motion charging via acceptance of dynamic braking energy.
e. Describe compatible stationary charger(s) available for rapid charging of batteries at terminal stations, to include:
    i. Input (AC) electrical requirements
    ii. Charging and data communication standards used
    iii. Exclusive or preferential relationships with specific charger manufacturer(s)
f. Describe the power management and fire protection systems used to prevent, detect, and address battery-related thermal events.
g. Describe the power management strategy for traction and auxiliary loads (HVAC, lighting)
h. Provide layout drawings of the car and truck assemblies, and train configurations.
i. Provide information on flexibility and scalability of train configurations.
j. Provide performance specifications for:
    i. Top speed
    ii. Acceleration
    iii. Braking
    iv. Vehicle range
    v. Door positions
    vi. Dynamic Clearance Envelope
    vii. Capabilities – passenger seating/standing for AW1 – AW3
k. Describe trainset modularity and flexibility to provide opportunity for future alternative propulsion options.

F. Maintenance and Overhaul

a. What is the projected remaining energy storage capacity (kWh) at end-of-life, as a percentage of nominal capacity when new?
b. Describe commercial warranty terms for BEMU batteries, including at a minimum:
    i. Warranty term (years and/or train hours)
    ii. Warranted remaining energy storage capacity (% of new) at end of warranty term
    iii. Any warranty limitations, such as proration near end of warranty term
c. Describe all scheduled maintenance activities for BEMU battery systems throughout their service life, to include inspections, and replacement of any consumable or line replaceable units with shorter life than the battery modules/packs. Examples would include cleaning of heat

exchangers, and filter, fluid, pump, or motor replacements for battery thermal management system.

d. Describe any maintenance charging required to balance batteries and/or maintain battery health and life beyond daily in-service charging (in-motion and high-power stationary terminal charging). If this activity is required, describe at a minimum:
    i. Required frequency (daily, weekly, monthly, etc.)
    ii. Power level (kW)
    iii. Duration (hours)

G. Commercial Questions & Information Sought: *Please respond to the following questions:*

a. If there are specific commercial terms that would deter or encourage your firm from pursuing this contract, please describe what they are.
b. If there is the potential for alternative financing possibilities, please describe what they are.

H. Other (Optional): Please include any other information that you have not discussed at this time. As a reminder, please do not include any corporate brochures or standardized marketing materials in this, or any other, section of the RFI response.

Estimated RFI Calendar:

Please note, respondents are required to monitor CommBuys for changes to the Procurement calendar.

PROCUREMENT ACTIVITY	DATE	TIME
RFI Release Date	11/26/2021	3:00 pm
Bid Response Deadline (Bid Opening Date & Time in CommBuys)	12/23/2021	3:00 pm

Instructions for Submission of Responses:

All vendor responses shall be submitted electronically via COMMBUYS. Responses shall be sent via the "Create Quote" functionality contained in COMMBUYS. For instructions concerning how to submit a Quote, please visit http://www.mass.gov/anf/docs/osd/forms/instructions-for-vendors-responding-to-bids.docx.

RFI Response Organization & Format:

RFI Response Organization - Please organize your RFI response as follows:

- **Introduction/Cover Letter** – See Section A. above. Introduction of your company and an overview of the RCM services you would intend to provide to the MBTA.
- **RFI Response** – RFI Response from the remaining Sections above. This would respond to the remaining sections and questions of the RFI.

RFI Response Document Format – To facilitate the review of each Respondents RFI, all RFI responses are requested to address each item in the RFI in the order in which it appears. The RFI responses must be submitted in one of the following formats:

- **Microsoft® or Adobe® Formats** – The RFI Response must be submitted in MS Word, MS Excel, or Adobe PDF formats. (MS Word or MS Excel versions must be Microsoft Office 2010 or greater and Adobe formats must be version 10.0 or greater). Please do not use embedded or nested documents within other documents.

RFI Response Submission – Responses are due by Wednesday, December 23, 2021 at 3:00 pm. They should be posted on CommBuys as a response to this RFI.

RFI Response Contact – Organizations responding to this RFI shall designate a single contact within that organization for the receipt of all subsequent information regarding this RFI.

Reimbursement – The MBTA will not reimburse organizations responding to this RFI for any costs in conjunction with their responses to this RFI.

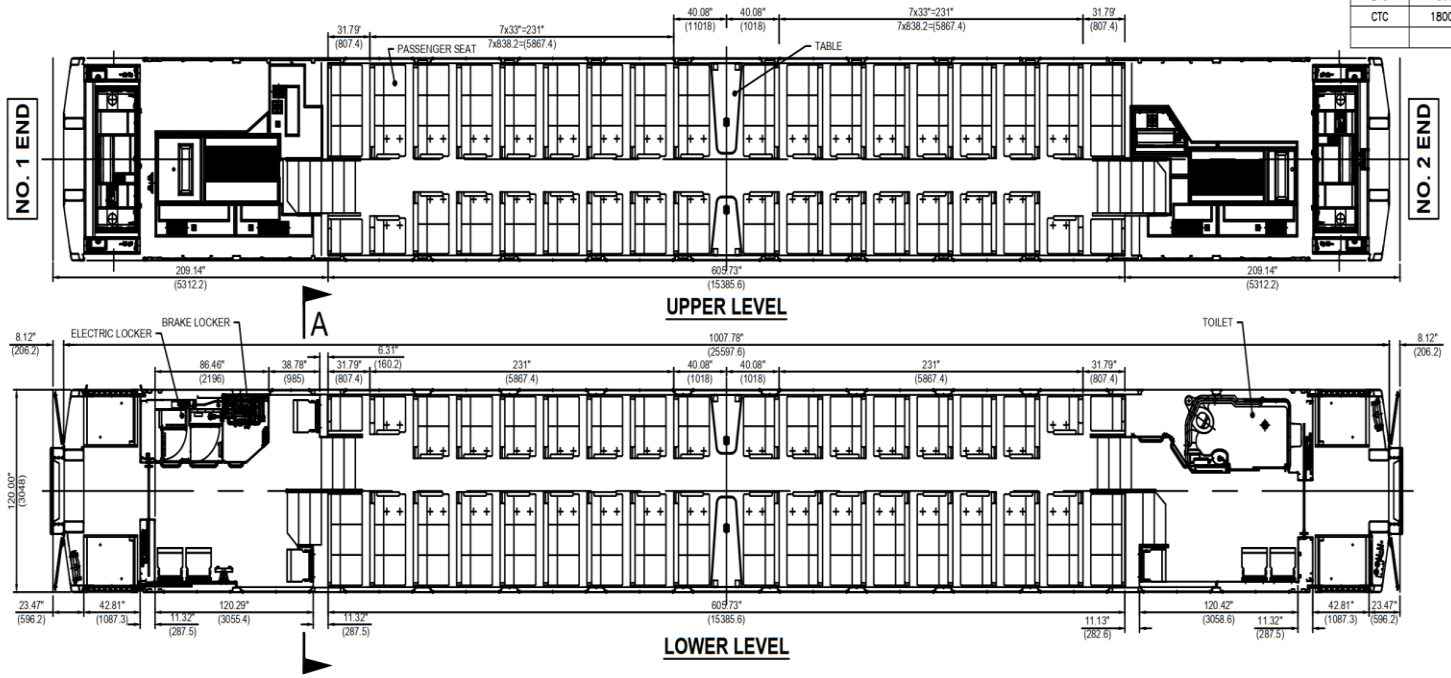
RFI Response Review Period:

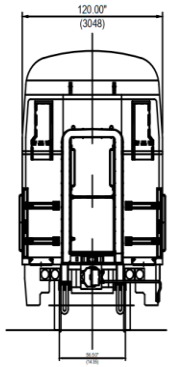
RFI Review Process – The RFI has several purposes: (1) RFI is to assist the MBTA with best-practice information for procurement of BEMUs, (2) Determine whether existing BEMU designs are available that could be readily modified for MBTA service, (3) Identify potentially interested bidders, (4) Identify key criteria that should be considered to avoid eliminating interested bidders.

RFI Respondent Follow-Up – The RFI Evaluation Committee, at its discretion, may elect to invite one or more RFI Respondent(s) to meet with the Team to discuss the Respondent's RFI Response in greater detail. The Respondent will be given adequate notice to respond to this request.

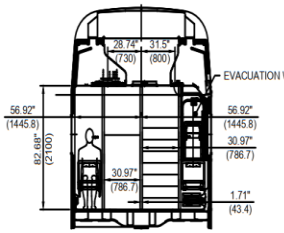
APPENDIX

WHERE APPLIED	
CLASS	ROAD NUMBERS
BTC	800–846
CTC	1800–1827

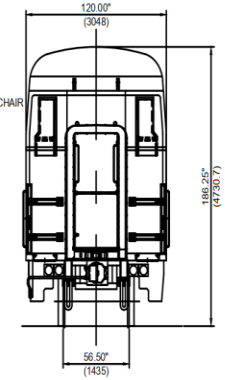




NO. 1 END



SECTION A-A



NO. 2 END

SEATING CAPACITY

FIRST LEVEL	86 PERSONS
MIDDLE LEVEL	7 PERSONS
SECOND LEVEL	86 PERSONS
TOTAL	179 PERSONS

REVISION	DATE	DESCRIPTION	APPROVED	ADOPTED

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

COMMUTER RAIL DESIGN STANDARDS

GENERAL ARRANGEMENT BLIND TRAILER COACH

DATE: 04-01-2020

FIGURE 11

FIGURE11_GENERAL ARRANGEMENT - BLIND COACH.DWG Plotted on 3-Jul-2020 10:42 AM

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, MassDOT Secretary & CEO
Steve Poftak, General Manager

massDOT
Massachusetts Department of Transportation

November 30, 2021

SUBJECT: RFI 180-21 Reduced CEVs: Battery Electric Multiple Units

COMMBUYS BD-21-1206-40000-40000-68878

Addendum No. 1

Dear Bidders:

Please be advised that the above has been amended and/or clarified herein.

Page 1 of the RFI Document is adjusted as follows:

Prior version: Responses due December 23, 2022
As revised: Responses due December 23, 2021

ALL ELSE REMAINS AS PREVIOUSLY STATED.

Sincerely,

Michael Pillemer

MBTA Procurement